

Montana request for information: State's survey responses regarding the use of HDPE pipe in mainline applications.

Montana will be installing three sizes of HDPE; 750m, 950mm, 1200mm on Interstate 94 nears Miles City in 2006.

The following information contains individual states and province experience with the use of HDPE.

Contact information is also contained in this report. Some states supplied specifications, interim reports and construction documentation. Some of the attachments have been included in the survey information.

The Florida DOT was kind enough to allow their reports to be available. Those reports and others are available on the same site as this survey. Please note that they are draft documents.

IOWA

The Iowa DOT does allow the use of HDPE pipe across our primary highway system. We do allow its use for entrances and secondary roads that are not hard surfaced (e.g., gravel).

Contact me if you have any additional questions.

Dave Claman, P.E.
Preliminary Bridge Engineer
Iowa DOT
(515) 239-1487

IDAHO

The Idaho Transportation Department has approved the use of high-density polyethylene pipe (HDPE) for use in side drains and cross drains up to a maximum pipe diameter of 48-inches, with a minimum cover requirement of 24-inches and a maximum fill height of 15 feet. I do not have any statistics on what percentage of plastic pipe is being used on our projects, but I have not heard of any problems with any of our plastic pipe installations.

Florida DOT has a research project underway with the use of HDPE pipe. The contact there is Rick.Renna@dot.state.fl.us. We would be interested in the results of your survey.

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GEORGIA

I am GDOT's contact for HDPE pipe discussion.

Brad Young, P.E.
Office of Materials & Research
Materials & Research Branch Chief
Physical, Chemical & Soil Testing Branch
Phone: (404) 363-7560
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e-mail: Brad.Young@dot.state.ga.us

NEW YORK

NYSDOT uses HDPEP in culvert applications. Please feel free to contact me for info:

Mike Stelzer
Materials Bureau
NYSDOT

mstelzer@dot.state.ny.us
(518)457-5956
(518)457-8171 (Fax)

ILLINOIS

Here are some people in my department that may be able to assist you.

Rodger Smith (217-782-2101) is the chairman of our pipe committee.

Ed Hughes (217-782-4689) is our Metal and Miscellaneous Materials Coordinator and his laboratory handles our plastic pipe testing.

Mark Gawedzinski (217-782-2799) performed a research study on plastic pipe.

James DuBose
Engineer of Products Evaluation
Illinois Department of Transportation
Bureau of Material & Physical Research
(217) 782-2921
dubosejb@nt.dot.state.il.us

KENTUCKY

We never use this on our projects. The State Highway Engineer is strongly opposed to use of plastic pipe. However, he may have allowed construction to use it on a few projects.

FLORIDA

My name is Michael Fazio, I work at UDOT in the Central Hydraulics Section. We have been using HDPE pipes in our ROW for a while. What information would you like to have?

We are completing a study on our existing pipe culvert conditions. We will have a final report in December. The Florida DOT has done a lot of research work on the HDPE.

Let me know,
Michael

Michael Fazio, P.E.
UDOT Hydraulics Section Manager
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Salt Lake City, UT 84119-8470
Bus: (801) 957-8556
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MARYLAND

The Maryland State Highway Administration has only approved the general of use of Type S HDPE or PVC pipe up to a diameter of 36" only outside the roadway template. On a case-by-case basis, we have allowed the same type of pipe within the roadway template (culvert crossings, etc.).

If you need further information, please contact Michael Wetzel at 410-545-8391. I also believe that Florida DOT has done extensive work regarding this matter in the recent years. You may want to contact Rick Renna at FDOT.

- Raja

CONNECTICUT

Craig,
ConnDOT has had limited experience with HDPE mainline crossing installations for sizes 750 to 1200mm. The few crossings that have been installed were constructed under maintenance operations and reported as performing satisfactorily. ConnDOT has developed the attached "HDPE Guideline" to assist designers on the various issues that should be considered when using this product. Should you require more specific information please contact me.

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Connecticut Department of Transportation
Hydraulics & Drainage
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ATTACHMENT FROM CONNECTICUT

Appendix C High Density Polyethylene Pipe (HDPE) Guideline

HDPE is available in 300mm (12 in), 375mm (15 in), 450mm (18 in), 600mm (24 in), 750mm (30 in), 900mm (36 in), 1050mm (42 in), 1200mm (48 in) diameters.

Advantages of HDPE:

HDPE is lightweight; easy to handle; hydraulically efficient; easy to cut; unaffected by brackish water, chemicals, and corrosive elements found in soils; produced in 6m (20 ft.) lengths; and is somewhat flexible, thus permitting smooth curvilinear installation.

Design Considerations:

Only HDPE smooth interior (Type S or Type D) shall be utilized. This type is hydraulically efficient and reportedly easier to install, since it is more rigid than the corrugated interior version.

Designers must recognize that a buried plastic pipe is a composite structure made up of a plastic ring and the soil envelope, and that both materials play a vital part in the structural integrity of the plastic pipe. In contrast, a buried reinforced concrete element is less influenced by the soil envelope.

- The successful performance of HDPE depends upon proper bedding, backfill and care in installation.
- The initial cost should not be the only basis for culvert material selection. The most economical culvert is one that has the lowest total annual cost over the design life of the structure.
- HDPE can easily be damaged during excavation activities for items such as underground utilities. Although field repairs can be accomplished using repair couplers available from the manufacturer, the designer needs to assess the overall risk of damage associated with other excavation activities before HDPE is selected.
- Minimum cover shall be established by the engineer based on an evaluation of specific site conditions. In the absence of pipe strength calculations, the minimum cover above the pipe shall be at least 0.9m (3 ft) or one pipe diameter (whichever is larger). The minimum cover should be maintained before allowing vehicles or heavy construction equipment to traverse the pipe trench.
- Maximum cover should be limited to 2.5m (8 ft) (measured to top of pipe).
- Pipe strength calculations in accordance with AASHTO Standard Specification for Highways and Bridges, Section 18 (ASD) or AASHTO LRFD Bridge Design Specifications Section 12 are required for the following installations:
 1. Installations subject to vehicle loads
 2. Fills greater than 2.5m (8 ft) (measured to top of pipe)
 3. Fills less than 0.9m (3 ft) (measured to top of pipe)
 4. Adverse soil conditions
 5. High water table
- Because HDPE pipe is relatively lightweight, buoyancy forces, especially at the culvert inlet, may be a concern. Anchorage in the form of a headwall, slope paving or other stabilization methods may be necessary.

- HDPE is susceptible to fire damage, especially at outfall locations. Therefore, fire damage may result due to an adjacent grass fire. Overall, the likelihood of damage is considered low.
- Since proper bedding and backfill are vital to a successful installation, diligent construction and inspection is needed.
- Installation shall conform to Section 6.5.1 of the Department's Standard Specifications.
- The design or construction engineer may elect to specify a Type II bedding installation when native backfill material is judged inadequate for use.
- Vibratory compaction of backfill can cause HDPE to shift and therefore appropriate measures and monitoring during installation are necessary. Normally, visual inspections are adequate to confirm the installation is acceptable. However, a mandrel test may be requested by the engineer when it is necessary to confirm the acceptability of an installation.
- When specifying HDPE pipe, designers must consider loads from construction vehicles **as well as those experienced during construction staging operations.**

Applications:

- The use of HDPE can be considered in the following locations:
 1. Temporary installations
 2. Areas remote from the traveled portions of pavements
 3. Medians
 4. Parking lots, (where vehicular traffic is light to moderate and truck traffic is light)
 5. Longitudinal installations on local and collector routes within the shoulder areas
 6. Slope drains
 7. Areas with little or no underground utility involvement
 8. Where parallel underground utility work is not likely in the foreseeable future

(Where parallel underground utility work is likely, the designer must be aware that it is possible to disrupt the supporting soil envelope adjacent to the pipe, which in turn can compromise the structural integrity of the pipe/soil system)

PENNSYLVANIA

Currently we allow the use of HDPE pipe at the diameters you have proposed. We do not allow them in areas that require a service life of 100 years. HDPE is allowed in areas where we specify service life of 50 years.

Currently we are reviewing our fill height limitations. My guess is we will allow the pipe up to 15ft. However, the bottom line is any company **MUST** perform design calcs to verify they can meet AASHTO.

It is also likely that HDPE will be certified to 100-year service life at some point in the future - but only after research being done by Florida is successfully completed.

Scott Christie

PENNDOT

Chief Bridge Engineer

PENNDOT Research
Commonwealth Keystone Building
400 North Street
6th Floor - K6East
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717.705.2202 (phone)
717.783.9152 (fax)
Work Hours: 7:30-4:00

MINNESOTA

For the trunk highway system we have allowed the use of HDPE pipe as an option to RCP for storm drain for over 10 years. Presently we limit the allowable sizes to 12"-36".

Presently on the trunk highway system we allow the use of HDPE pipe for culvert only under side roads and entrances. We do not allow it for centerline culvert.

There have been a limited number of HDPE pipes installed as centerline culverts (mostly installed by maintenance personnel).

In 2000 we began a research project at our MN/ROAD test facility near Monticello, MN. Dr. Timothy McGrath with Simpson Gumpertz and Heger is performing the study.

In that project, we installed 8 HDPE pipes, 1 CSP, and 1 RCP (all 60" pipes). We used 2 different backfill materials and 2 different shallow overfills. The pipes were rather heavily instrumented. Dr. McGrath collected data from 2000 through 2002. He is presently working on completing the final report due in January 2004.

If you have any questions, please give me a call.

John Boynton
Hydraulics Engineer
Minnesota Department of Transportation
3485 Hadley Avenue North
Oakdale, MN 55128

Tel: 651-747-2162
Fax: 651-747-2115

KENTUCKY

The State of Kentucky does not permit on NHI routes. Basically, the Contractor must utilize the Design Fill Height Tables to determine the applicability of the various types of pipe for the project. Restrictions on type and application are all contained in those documents.

Hope this helps.

Thanks,

Morgan Miller Morgan.
Miller@mail.state.ky.us

FLORIDA

Florida has been using HDPE pipe on a limited basis for many years. We recently employed Drs. Hsuan and McGrath, co-authors of NCHRP 429, to create the attached HDPE service life design and testing protocol. This was sent around the nation and to "mgoodman@state.mt.us" on 9-5-03. We had a national conference call on this topic on Sept. 25th. The protocol is under review as a draft document.

(See attached file: Installation Final Report 8-3-03.pdf)(See attached file: Materials Final report 9-2-03.pdf)

NCHRP 429 conducted the same type of national review of HDPE experience. Drs. McGrath and Hsuan continue to work with a number of states and the NCHRP to investigate HDPE pipe. You may wish to contact them about the work they did for Florida and their continuing work with HDPE pipe. I have copied them on this email.

COLORADO

CDOT has some experience in using HDPE of various sizes on mainline crossing applications. CDOT is in the process of updating its drainage manual to address selection of culvert pipe materials in culvert design. Currently, we have provisions in our specifications book that allow the contractors to use alternate culvert pipe materials (i.e. HDPE, CMP, RCP, PVC, etc.). For HDPE application experiences on mainline crossings, the following individuals can be contacted:

Amanullah Mommandi, Senior Hydraulics Engineer, Tel.# 303-757-9044;
Ina Zisman, Region 1 Resident Engineer, Tel.# 303-512-5751, and
Al Gross, Region 1 Hydraulics Engineer, Tel.# 303-757-9342.

Please let us know if we could be of further assistance to you. Thanks and have great day.

Roberto de Dios
P.E. I, CDOT Research Branch
Tel. No. 303-757-9975

NEW JERSEY

The NJDOT uses HDPE pipe on a limited basis. Because of concerns with this material, we do not permit HDPE pipe to be constructed across a mainline, where a high water table exists, and as the last section discharging to a stream.

Your research effort is of interest to us. Please feel free to contact

our Drainage Engineer, Mr. Kiong Chan, at 609-530-2502.

Lad Szalaj
Project manager, Research
609-530-4569

WISCONSIN

Craig we have installed some large diameter pipes in a trial. We are using pipes as cross drains under the roadways that have less than 4500 ADT.
<http://www.dot.wisconsin.gov/library/research/docs/finalreports/tau-finalreports/hdpepipe.pdf>

I am interested in the findings/work plan of your study as we are interested in the performance of the pipes.

Sincerely, Pete Kemp

Peter J Kemp
New products / New methods Engineer
Technology Advancement Unit
Division of Transportation Infrastructure Development
Wisconsin Department of Transportation
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voice: 608-246-7953
fax: 608-246-4669

(ATTACH WISCONSIN CONSTRUCTION REPORT)

WASHINGTON

Craig, glad I can be of assistance to your research project, here is some more information on pipe manufacturers

ADS Advanced Drainage Systems <http://www.ads-pipe.com/us/en/index.shtml>
Contact: Jeff Beck

Hancor Inc <http://www.hancor.com/splash.asp>
Contact: Jim Wiley

Polytubes Ltd. (I don't have a website address for this guy)
Contact: Trent Langford

The Corrugated Polyethylene Pipe Association has a website too, with a link to the PPI website, which is the Plastic Pipe Institute,
<http://www.cppa-info.org/index.html>

Our own WSDOT website contains a bunch of stuff including all our manuals (which I am also sending you a cd of), they are at:
<http://www.wsdot.wa.gov/FASC/EngineeringPublications/default.htm>

And our Qualified Products list, this is the list we talked about where we pre-qualify a product so contractors know it can be used on a project without having to do a special request. Here is that website:
<http://www.wsdot.wa.gov/biz/mats/QPL/QPL.cfm>

You now have my email address, my phone is 360.705.7269. Mailing address is:

WSDOT
310 Maple Park Avenue SE
Olympia, WA 98501-2361

AASHTO

AASHTO's National Transportation Product Evaluation Program (NTPEP) is coordinating materials testing of HDPE Plastic Pipe, including resin testing. Perhaps our reported information is available on the NTPEP website, www.ntpep.org, where currently we have ADS products whose products have completed testing. That information may prove useful to your research. Please let me know if you end up using it as a reference, as it would tie into our "NTPEP Allied Research" initiative.

Regards,
Mujeeb Basha, PE
NTPEP Coordinator
Sr. Staff Engineer, AASHTO
202-624-3695

MANITOBA

Manitoba Transportation has used HDPE a few times in the past 5 years. We are in the product evaluation stage. All these installations were not installed in the major highway. Please call or email for more specify info. Also let me know your research results.

Cheers
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Manitoba Transportation & Government Services
Materials Engineering Branch
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TENNESSEE

Tennessee D.O.T. began allowing the use of HDPE pipe in 2001. We limit the pipe diameter to 48", maximum fill height of 10 feet and only allow them in cross drain situations on local roadways with less than 1000 ADT.

We also allow the use of HDPE pipe for side drains or driveway entrances and longitudinal median drains. The 10 foot fill height and 48-inch maximum diameter still applies but there are no ADT requirements.

In all the above cases, I have said we allow because we always have alternate bid items for RCP and CMP. Our experience is limited since in most cases RCP is the alternate bid by the contractor.

We have used HDPE in some of our maintenance installations with no problems that I know of.

Steve Hall
Materials and Tests Division
615-350-4167

WYOMING

The contact person in Wyoming is the State Materials Engineer, Rick Harvey. Phone 307-777-4476.

As an addendum to the contact Rick Harvey, you may also wish to contact Bill Wilson, in Engineering Services 307-777-4216.

ARIZONA

Here are a couple of Arizona Department of Transportation contacts who may be able to give you some background on ADOT experiences.

Terry Otterness
Phone: (602) 712-4285
e-mail: TOtterness@dot.state.az.us

Dennis Crandall
(602) 712-7197
e-mail: DCrandall@dot.state.az.us

MAINE

This is a very timely question. I was going to send out a similar request myself.

MaineDOT currently allows up to 48" diameter for cross pipe applications. We use a performance spec (maximum deflection) to help ensure a good installation. We are having a few problems with pipe cracking on the larger sizes. I am the contact for information on this topic.

Dale Peabody
Transportation Research Engineer
MaineDOT
16 State House Station

Augusta, ME 04333-0016
phone: 207-624-3305
fax: 207-624-3301

ARKANSAS

The Arkansas State Highway and Transportation Department does not allow the use of HDPE for drainage crossings on any type of State Highway. The only location where plastic pipe is allowed is for private driveway drains.

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Roadway Design Division Head
Arkansas State Highway and Transportation Department
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Little Rock, AR 72203
Phone 501-569-2336
Fax 501-569-2057

NEW HAMPSHIRE

NH has been using this pipe for several years. We are allowing pipe sizes to 900 mm. We have not been using it for mainline crossing applications yet. We have not had any failures.

You may contact me for any further information that you may need.

Alan D. Perkins, PE
PO Box 483
Concord, NH 03302
Phone: 603 271 1545
Fax: 603 271 8700

LOUISIANA

Kirt Clement
225-767-9127
kclement@dotd.state.la.us

OREGON

Contact Dan MacDonald, ODOT Standards Engineer (503)986-3779